

UNCLASSIFIED

AD NUMBER
AD462394
NEW LIMITATION CHANGE
TO Approved for public release, distribution unlimited
FROM Distribution authorized to U.S. Gov't. agencies only; Foreign Government Information; DEC 1964. Other requests shall be referred to British Embassy, 3100 Massachusetts Avenue, NW, Washington, DC 20008.
AUTHORITY
DSTL, ADM 227/2383, 19 Feb 2009

THIS PAGE IS UNCLASSIFIED

COMMERCIAL-IN-CONFIDENCE

TECHNICAL NOTE No. 2781

NSIC/0830 / 65

U.S. GOVERNMENT PRINTING OFFICE: 1964 O - 348-000

CATALOGED BY: DDC

AS AD NO.

462394

462394

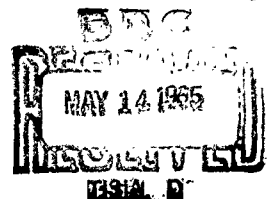
MECHANICAL DEPARTMENT
ADMIRALTY ENGINEERING
LABORATORY

WEST DRAYTON, MIDDLESEX

PRESSURE GAUGE TYPE TESTS - BUDENBERG GAUGE CO. LTD.

(PHOSPHOR-BRONZE TUBES)

The information in this document is disclosed in confidence to the recipient government on condition that it is not circulated outside government departments without the prior permission of the Ministry of Defence (Navy Department).
2. The recipient is warned that information contained in this document may be subject to privately owned rights.



U.S. GOVERNMENT PRINTING OFFICE: 1964 O - 348-000

Copy No. 25

COMMERCIAL-IN-CONFIDENCE

A.E.L. TECHNICAL NOTE No. 1731.

DECEMBER, 1964.

ADMIRALTY ENGINEERING LABORATORY
WEST DRAYTON.

PRESSURE GAUGE TYPE TESTS - BUDENBERG GAUGE CO. LTD.

(PHOSPHOR-BRONZE TUBES)

Requests for permission to publish or disclose any of the material contained in this document and any enquiries concerning its contents should be addressed to: Director of Marine Engineering, Ministry of Defence, Bath.

This document is issued by Superintendent, Admiralty Engineering Laboratory, and the views expressed in it are not necessarily those of the Director of Marine Engineering, Ministry of Defence, Bath. Any conclusions or opinions are to be regarded as being of an interim nature and may be subject to revision after further investigation.

COMMERCIAL-IN-CONFIDENCE

COMMERCIAL-IN-CONFIDENCE

ii

SUMMARY

Two 4" gauges, one surface mounting, 0-200 p.s.i. for use with Oxygen, and one flush mounting, 0-600 p.s.i., were resubmitted by Budenberg Gauge Co.Ltd. for type test approval in accordance with ADSPEC.1001A. The Oxygen gauge met all the specified requirement, except for two minor points in construction. The other gauge failed the shock tests in that physical damage occurred during these tests.

COMMERCIAL-IN-CONFIDENCE

COMMERCIAL-IN-CONFIDENCE

A.E.L. TECHNICAL NOTE No.1731.

DECEMBER, 1964.

D I S T R I B U T I O N

	<u>Copy No.</u>
4 copies - A.E.L. (internal use)	1-4
1 copy - Ship Dept. Library, Bath.	5
3 copies - D.G. Ships, D.M.E., Bath. (1 copy Attn. Cdr. L.I. Wills, R.N. XEIV/130.) (2 copies Attn. Section XEIV/130)	6 7&8
24 copies - N.S.T.I.C. Report Section/R.D.S.D.(N) for distribution to:	9 - 32
C.B.N.S.	- 2 copies
U.S.N.A.	- 5 copies
U.S.O.N.R.(L)	- 1 copy
U.S.J.S.R.P.	- 2 copies
S.(T).O. Ottawa	- 1 copy
N.T.L.O. Australia	- 1 copy
1 copy - C.R.N.S.S.	33

COMMERCIAL-IN-CONFIDENCE

v

A.E.L. TECHNICAL NOTE N.

DECEMBER

C O N T E N T S

	<u>Para</u>
INTRODUCTION	1
TEST PROCEDURE	5
TEST RESULTS	7
CONCLUSIONS	10
FIGURES 1 - 4.	

COMMERCIAL-IN-CONFIDENCE

COMMERCIAL-IN-CONFIDENCE

A.E.L. TECHNICAL NOTE No. 1731.

DECEMBER, 1964.

ADMIRALTY ENGINEERING LABORATORY
WEST DRAYTON.

PRESSURE GAUGE TYPE TESTS - BUDENBERG GAUGE CO.LTD. (PHOSPHOR-BRONZE TUBES)

INTRODUCTION

1. Two 4" gauges, one surface mounting, 0-200 p.s.i. range for use with Oxygen, and one flush mounting, 0-600 p.s.i. range, were resubmitted for type test approval in accordance with ADSPEC. 1001A.
2. Beryllium-copper bourdon tubes are fitted as standard to gauges of this type and size at present supplied by this firm. The gauges reported upon herein are fitted with phosphor bronze tubes.
3. The Oxygen gauge as originally received, with an orifice check in the inlet connection, would not respond to pressure, even with the orifice check removed. Whatever caused the restriction was corrected by the makers and the gauge returned without the orifice check for testing.
4. Tests were conducted between 26th September and 8th December, 1964, under A.E.L., R & D Programme, Work Item No.406/1.

TEST PROCEDURE

5. Each gauge was examined and then tested for accuracy at the various stages of the type tests as detailed in ADSPEC. 1001A. up to the point when physical damage occurred.
6. A Budenberg dead weight tester was used to carry out the accuracy tests.

TEST RESULTS

7. These are displayed graphically in Figs. 1 and 2, which also include inspection remarks.
8. The straight line boundaries on each graph indicate the specified limits of error for the relevant accuracy test.
9. Damage to the flush mounting, 0-600 p.s.i. range gauge that occurred during the shock tests is shown in Figs. 3 and 4.

CONCLUSIONS

10. The surface mounting, 0 - 600 p.s.i., Oxygen gauge withstood all tests and its accuracy throughout remained within the specified limits, but it did not meet the specification in two relatively minor points. Although with the distance pieces assembled the fixing holes are the correct diameter it is considered that the 5/16" diameter holes on the specified P.C.D. in the mounting flange excessively weakens the flange. The minimum thickness of metal between the holes and the outside diameter of the flange is less than 1/16".

/ The Ads spec

COMMERCIAL-IN-CONFIDENCE

COMMERCIAL-IN-CONFIDENCE

- 2 -

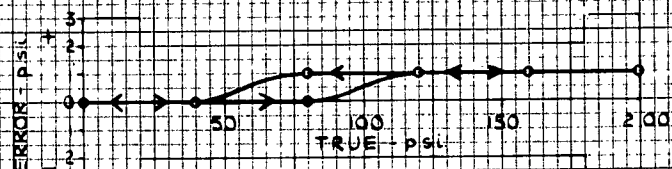
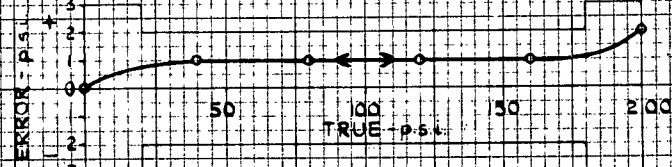
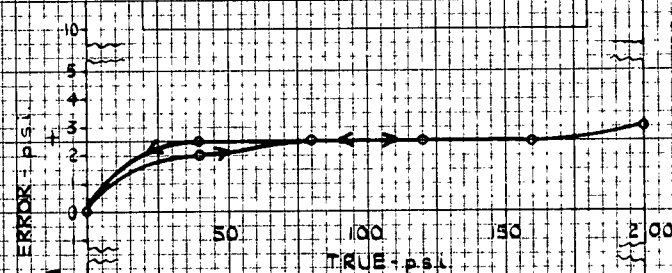
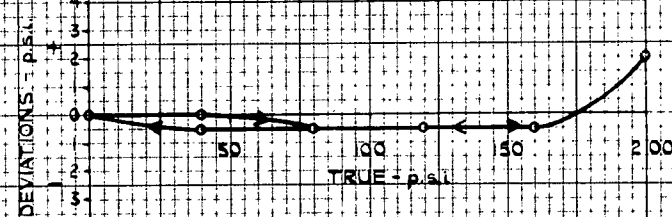
The Adspeg does not favour the use of plastic material for the back plate, but it withstood the shock tests without damage.

11. The flush mounting, 0-600 p.s.i., gauge failed to meet the specified requirements, in that physical damage occurred during the shock tests. It is recommended that future submissions should not include any fitments restricting free movement of the bourdon tube during testing. Also, if countersunk securing holes are required in the aluminium back plate its thickness should be increased.

Experimental Work by - G.C.J. HARNER,
(Senior D'man.)
Head of Section - M. RICHARDS,
(Commander, R.N.)

COMMERCIAL-IN-CONFIDENCE

COMMERCIAL-IN-CONFIDENCE

① INITIAL ACCURACY
WITHIN SPECIFIED
LIMITS② AFTER OVERLOAD
WITHIN SPECIFIED
LIMITS③ AFTER SHOCK
WITHIN SPECIFIED
LIMITS④ AFTER PULSING
WITHIN SPECIFIED
LIMITS

⑤ INSPECTION REMARKS.

GAUGE MEETS THE SPECIFIED REQUIREMENTS, EXCEPT IN THE FOLLOWING RESPECTS :-

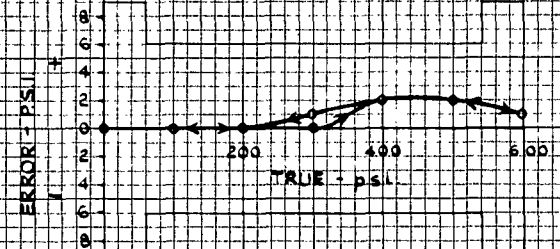
- a.) DIAMETER OF HOLES IN MOUNTING FLANGE IS $\frac{5}{16}$ " THESE HOLES ARE DRILLED TO SUIT DISTANCE PIECES PROVIDED WITH THE GAUGE. THE DISTANCE PIECES ARE DRILLED FOR 2BA. SCREWS, THE SIZE SPECIFIED FOR THE MOUNTING FLANGE IN TABLE 4, COLUMN 3 OF BS. 1780:1960.
- b.) A PLASTIC BACK PLATE IS FITTED, THE WHOLE PLATE FORMING THE BLOW OUT FEATURE. THE BACK PLATE IS HELD IN POSITION BY ONE METAL STRIP SECURED TO THE CASE BY TWO SCREWS.

BUDENBERG, 4" S, 0-200 p.s.i. OXYGEN GAUGE,
TEST RESULTS.

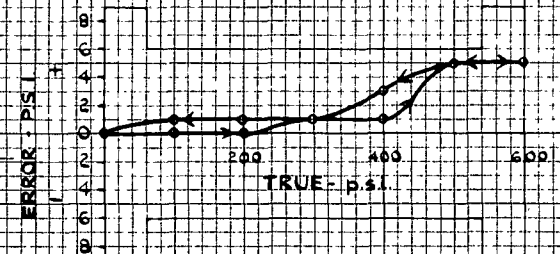
COMMERCIAL-IN-CONFIDENCE.

COMMERCIAL-IN-CONFIDENCE.

① INITIAL ACCURACY
WITHIN SPECIFIED
LIMITS.



② AFTER OVERLOAD
WITHIN SPECIFIED
LIMITS.



③ SHOCK TEST

DAMAGE OBSERVED DURING AND IMMEDIATELY AFTER SHOCK TESTS :-
1ST DROP (GAUGE MOUNTED VERTICALLY AND CONNECTION AT 6 O'CLOCK).
- POINTER BENT SLIGHTLY (SEE FIG. 3).
4TH DROP (GAUGE MOUNTED HORIZONTALLY AND DIAL FACING UPWARDS).
- BACK PLATE EXTRUDED OVER ONE OF ITS SECURING SCREWS (SEE FIG. 4)
AND ZERO ERROR APPROXIMATELY ± 70 psi. (SEE FIG. 3). ROTATION OF
POINTER ON PINION HAD NOT OCCURRED AS FAR AS CAN BE ASCERTAINED.
HAIRSPRING DISTORTED TO SOME EXTENT.
BOURDON TUBE END PIECE HAD CONTACTED BACK OF DIAL AND BRASS STOP
(SEE FIG. 3). SECURED TO BACK PLATE IN WAY OF TUBE END PIECE. FORCE ON
STOP CAUSED EXTRUSION OF BACK PLATE.

④ INSPECTION REMARKS

GAUGE MEETS THE DIMENSIONAL AND MATERIAL REQUIREMENTS OF
ADSPEC 100TAL., BUT THE 22 SWG ALUMINIUM BACK PLATE IS
COMPARATIVELY WEAK AT THE COUNTERSUNK SECURING HOLES.
THE BRASS STOP, FITTED PRESUMABLY TO PREVENT FREE MOVEMENT
OF TUBE TOWARDS BACK PLATE WHEN UNDER VIBRATION, IS CONSIDERED
TO BE AN UNDESIRABLE ITEM, ALTHOUGH FITTING OF SUCH ITEMS IS
NOT PRECLUDED IN THE SPECIFICATION.

BUDENBERG, 4" F, 0-600 psi. GAUGE.
TEST RESULTS.

COMMERCIAL-IN-CONFIDENCE.

COMMERCIAL-IN-CONFIDENCE

A.E.L. TECHNICAL NOTE NO.1731.

FIG.3.

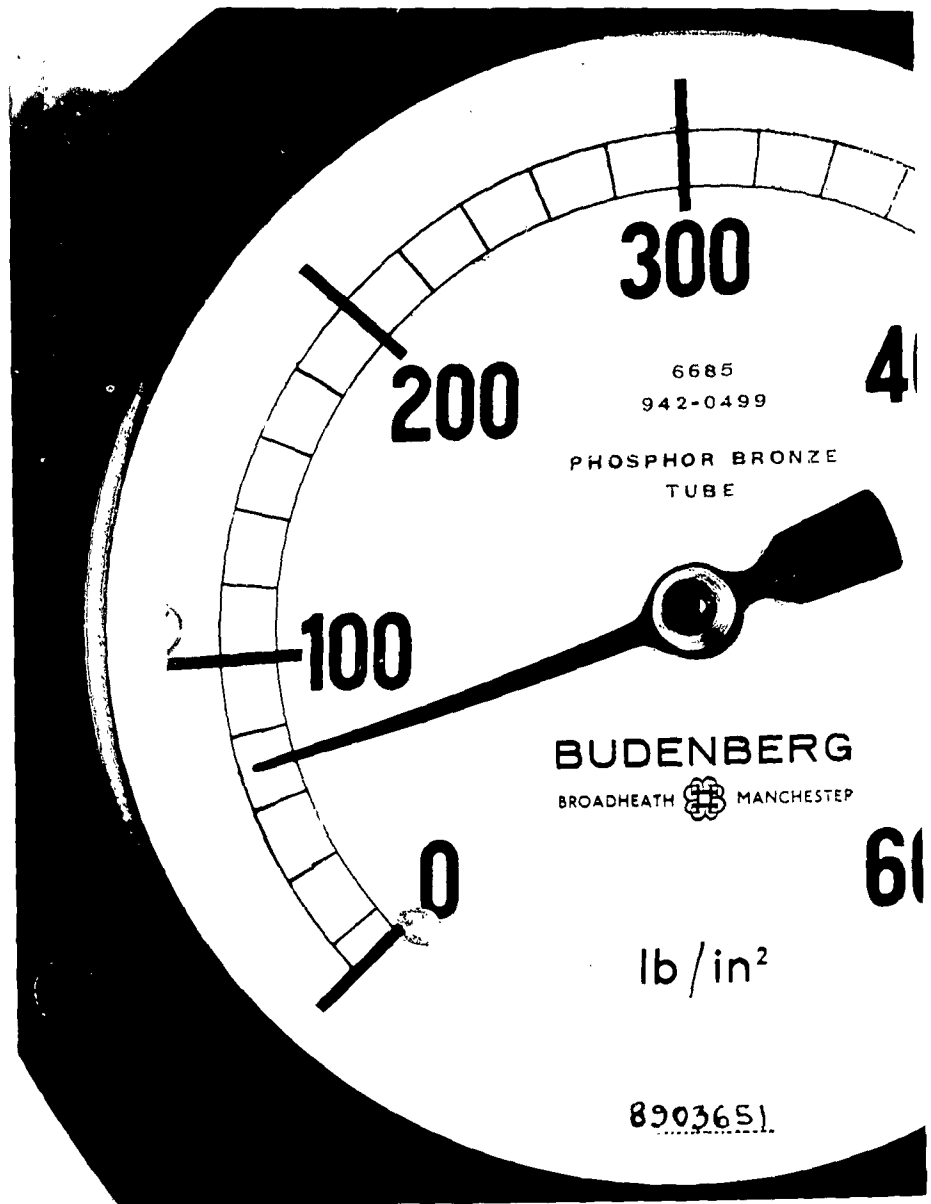


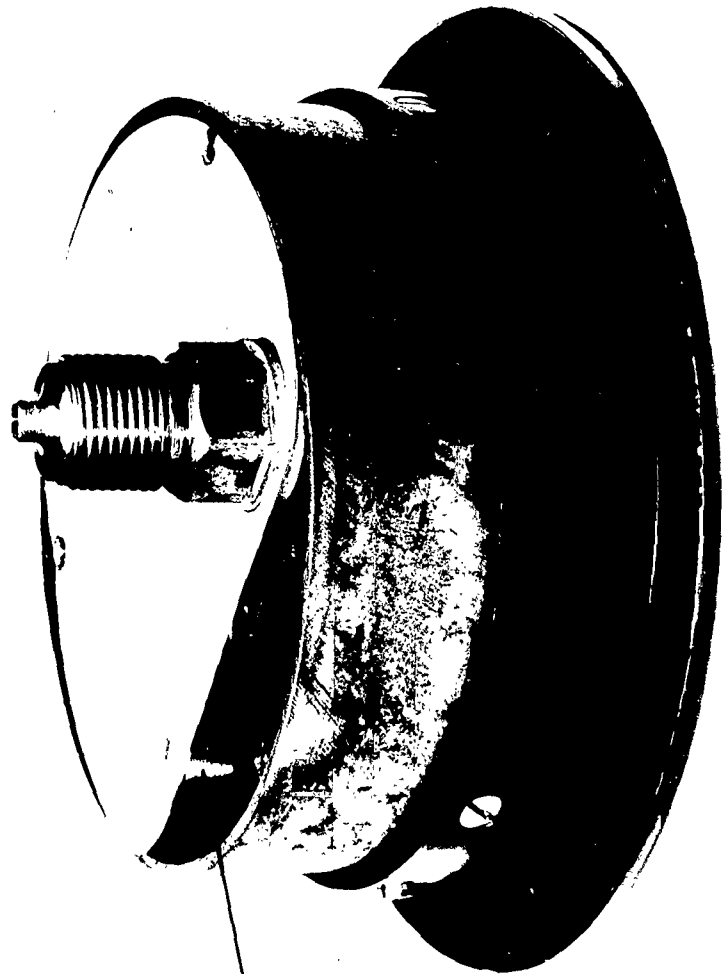
FIG.3. BUDENBERG, 4"(F), 0-600 p.s.i. GAUGE -DIAL INDICATING BENT POINTER AND ZERO ERROR AFTER SHOCK TESTS.

COMMERCIAL-IN-CONFIDENCE

COMMERCIAL-IN-CONFIDENCE

A.E.L. TECHNICAL NOTE NO.1731.

FIG.4.



BRASS STOP IN WAY
OF BOURDON TUBE
END PIECE.

FIG.4. BUDENBERG, 4" (F), 0600 p.s.i. GAUGE - VIEW INDICATING DAMAGE TO BACK PLATE DURING SHOCK TESTS.

COMMERCIAL-IN-CONFIDENCE



Defense Technical Information Center (DTIC)
8725 John J. Kingman Road, Suit 0944
Fort Belvoir, VA 22060-6218
U.S.A.

AD#: AD462394

Date of Search: 19 February 2009

Record Summary: ADM 227/2383

Pressure gauge type tests: phosphor-bronze type tubes
Former reference (Department): Note No. 1731
Held by The National Archives, Kew

This document is now available at the National Archives, Kew, Surrey, United Kingdom.

DTIC has checked the National Archives Catalogue website (<http://www.nationalarchives.gov.uk>) and found the document is available and releasable to the public.

Access to UK public records is governed by statute, namely the Public Records Act, 1958, and the Public Records Act, 1967.
The document has been released under the 30 year rule.
(The vast majority of records selected for permanent preservation are made available to the public when they are 30 years old. This is commonly referred to as the 30 year rule and was established by the Public Records Act of 1967).

This document may be treated as **UNLIMITED**.